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ABSTRACT

In the Fall of 1998, a World Wide Web course called "Introduction to Music Theory and Aural Skills" was published at Murray State University (Kentucky) as an interactive and self-contained learning environment to provide a partial solution to the problem of incoming music students' inadequate preparation in fundamental music theory concepts. This paper provides an overview of the course design, highlighting aspects of HTML and JavaScript which provide interactivity. Recent course revisions have involved rewriting the material using Macromedia's Director, and the two authoring environments are compared and contrasted. (MES)

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Introduction to Music Theory and Aural Skills: A Study in Developing an Interactive Music Learning Environment for the Internet

Mid-South Instructional Technology Conference
Middle Tennessee State University
April 9-11, 2000

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ABSTRACT

Significant numbers of incoming music students at this regional public university are determined to have less than adequate preparation in fundamental music theory concepts. In the Fall of 1998, a web course called Introduction to Music Theory and Aural Skills was published as an interactive and self-contained learning environment to provide a partial solution to this problem.

This presentation will provide an overview of the course design, highlighting aspects of HTML and JavaScript which provide interactivity. Recent course revisions have involved rewriting the material using Macromedia's Director. Some initial comparisons and contrasts between the two authoring environments will be made.

BACKGROUND

By means of diagnostic examinations, significant numbers of incoming college freshman music students at this regional public university are determined to have less than adequate preparatory music theory knowledge. To enroll in and successfully pass the first semester of four sequenced levels of music theory courses, a vast majority of students first need remedial help in such fundamental concepts as constructing scales, labeling intervals, counting simple rhythms, naming key signatures, broadly defining the most basic terminology and recognizing common notation symbols. A course called Introduction to Music Theory and Aural Skills was designed and implemented on campus to meet that need in the Fall of 1991.

Although the creation of the course "fixed" the problem of remedial skills at the college level, students with a weak theoretical background continue to enroll as music majors in increasing numbers. In seeking further resolution to the problem, two options became the focus of attention when the decision was made to develop an internet version of the fundamental music theory course. Create an interactive web course that could be taken by: 1) anyone with a computer with no help from an instructor, or 2) anyone who has paid the fees to be officially enrolled allowing for minimal help from an instructor.

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Establishing that audience base meant that the course could be completed by: 1) college freshmen music majors who are diagnosed as being "border line" in music theory preparation; 2) high school students (in a music class that is supervised by a music instructor); 3) high school students on their own initiative (to prepare for college level diagnostic exams); or 4) anyone with an interest in the fundamentals of music theory.

INITIAL DESIGN CONSIDERATIONS

Practical design considerations for an internet music theory fundamentals course involved recognizing the need to create musical examples as images, musical examples as sound files and an interactive environment as an enhanced learning tool. To create an interesting learning interface, certain programming objectives and considerations were established as high priority.

First, reading from the computer screen can be naturally interactive. A user can be asked to react to written text by pointing and clicking the mouse. Instructions can be highlighted, essential points can be clarified and questions can be answered by passing the mouse over text or images. Second, hearing the examples is of paramount importance. If the sound bytes are small enough to be downloaded quickly, the computer is an adequate tool for providing audio examples. Many software titles, such as "SoundEdit" and "Deck", are designed to expedite the creation of audio examples. When discussing scales, students are able to experience the difference between major and minor by listening to examples of each. When determining the characteristic sound of a particular interval, no verbal explanation can replicate the actual sound of that interval. Third, the course had to be cross-platform and current (but not "cutting-edge"). Most public school systems in our region do not have the funding to maintain technological currency, so remaining behind the "state-of-the-art" by one generation seemed a practical consideration. Fourth, Internet students must have the same ability to put pencil to paper as the students who take the parent in-class course. For that reason, Adobe Acrobat files were created and made available for download. Such files include manuscript paper for drawing symbols, practice tests which include musical examples and glossary files which can be downloaded, printed and studied.

CREATING INTERACTIVITY

Interactivity was deemed at the outset of development as being very important. The course author and developer is not a programmer and was initially confined to learning to writing in HTML code. To create the interactive element, some public domain JavaScript was adapted to suit the needs of the course.

The following basic HTML code is all that is needed to create a web document that prints CHAPTER INDEX in the middle of a white page and places four clickable images below that.

```
<HTML>
<HEAD>
```

```
<TITLE>Chapter Index</TITLE>
</HEAD>
<BODY BGCOLOR="#ffffff" ALINK="#000000" VLINK="#595c5e">
<P ALIGN=CENTER><B><BR>
<FONT SIZE="+2">CHAPTER INDEX<BR>
</FONT></B></P>
<P ALIGN=CENTER><A HREF="../chapter1/ch1page1.htm",window.status='Chapter
One: Musical Symbols';return true"
><IMG SRC="pix/ch1off.gif" BORDER="0"
NAME="toc1" ALIGN="MIDDLE" WIDTH="151" HEIGHT="22"
NATURALSIZEFLAG="0"
ALT=""></A> <BR>
<A HREF="../chapter2/ch2page1.htm",window.status='Chapter Two: Note and Rest
Values';return true"><IMG
SRC="pix/ch2off.gif" BORDER="0"
NAME="toc2" ALIGN="MIDDLE" WIDTH="151" HEIGHT="22"
NATURALSIZEFLAG="0"
ALT=""></A> <BR>
<A HREF="../chapter3/ch3page1.htm",window.status='Chapter Three: Rhythm'; return
true"><IMG SRC="pix/ch3off.gif"
BORDER="0"
NAME="toc3" ALIGN="MIDDLE" WIDTH="151" HEIGHT="22"
NATURALSIZEFLAG="0"
ALT=""></A><BR>
<A HREF="../chapter4/ch4page1.htm",window.status='Chapter Four: Meter
Signatures';return true"><IMG
SRC="pix/ch4off.gif" BORDER="0"
NAME="toc4" ALIGN="MIDDLE" WIDTH="151" HEIGHT="22"
NATURALSIZEFLAG="0"
ALT=""></A><BR>
</P></BODY>
```


To add interactivity to the images, such as "rollovers", JavaScript is necessary. The following added code (in bold) allows each of the above images to change as the mouse passes over any one of them.

```
<HTML>
<HEAD>
<TITLE>Chapter Index</TITLE>
<SCRIPT LANGUAGE="JavaScript">
```

```
{ toc1on = new Image();
toc1on.src = "pix/ch1on.gif";
toc2on = new Image();
toc2on.src = "pix/ch2on.gif";
toc3on = new Image();
toc3on.src = "pix/ch3on.gif";
toc4on = new Image();
toc4on.src = "pix/ch4on.gif";
toc1off = new Image();
toc1off.src = "pix/ch1off.gif";
toc2off = new Image();
toc2off.src = "pix/ch2off.gif";
toc3off = new Image();
toc3off.src = "pix/ch3off.gif";
toc4off = new Image();
toc4off.src = "pix/ch4off.gif";
}

function img_act(imgName) {
{ imgOn = eval(imgName + "on.src");
document [imgName].src = imgOn;
}
}

function img_inact(imgName) {
{ imgOff = eval(imgName + "off.src");
document [imgName].src = imgOff;
}
}
</SCRIPT>
</HEAD>
<BODY BGCOLOR="#ffffff" ALINK="#000000" VLINK="#595c5e">

<P ALIGN=CENTER><B><BR>
<FONT SIZE="+2">CHAPTER INDEX<BR>
</FONT></B></P>
<P ALIGN=CENTER><A HREF="../chapter1/ch1page1.htm"
onMouseover="img_act('toc1'),window.status='Chapter
One: Musical Symbols';return true" onMouseout="img_inact('toc1')"><IMG
SRC="pix/ch1off.gif" BORDER="0"
NAME="toc1" ALIGN="MIDDLE" WIDTH="151" HEIGHT="22"
NATURALSIZEFLAG="0" ALT=""></A> <BR>
<A HREF="../chapter2/ch2page1.htm"
onMouseover="img_act('toc2'),window.status='Chapter Two: Note and Rest
Values';return true" onMouseout="img_inact('toc2')"><IMG SRC="pix/ch2off.gif"
BORDER="0" NAME="toc2"
```

```
ALIGN="MIDDLE" WIDTH="151" HEIGHT="22"
NATURALSIZEFLAG="0" ALT=""></A> <BR>
<A HREF="../chapter3/ch3page1.htm"
onMouseover="img_act('toc3'),window.status='Chapter Three: Rhythm';return
true" onMouseout="img_inact('toc3')"><IMG SRC="pix/ch3off.gif" BORDER="0"
NAME="toc3" ALIGN="MIDDLE"
WIDTH="151" HEIGHT="22" NATURALSIZEFLAG="0" ALT=""></A><BR>
<A HREF="../chapter4/ch4page1.htm"
onMouseover="img_act('toc4'),window.status='Chapter Four: Meter
Signatures';return true" onMouseout="img_inact('toc4')"><IMG SRC="pix/ch4off.gif"
BORDER="0" NAME="toc4"
ALIGN="MIDDLE" WIDTH="151" HEIGHT="22" NATURALSIZEFLAG="0"
ALT=""></A><BR>
</P>
</BODY>
```

Part of the code (window.status='Chapter Three: Rhythm';return true) also allows for an additional message in the STATUS BAR at the bottom of the window. This is a device particularly useful in revealing answers to questions which may be posed in the main body of the document.

The code which creates the JavaScript rollover was the primary source code for creating most of the interactivity required for this course. Rollover images may be used for revealing answers, animating examples and manipulating images as the user passes the mouse over a picture or clicks on a designated spot within an image map. The code was copied and pasted into documents, and edited, as the instructional needs arose during the design stages of course development.

COURSE CONTENT

Course content is very similar to the on-campus version of the course. It also follows the same content outline as many programmed textbooks and could be used to supplement most of them. The chapters include:

Chapter One: Musical Symbols
Chapter Two: Note and Rest Values
Chapter Three: Rhythm
Chapter Four: Meter Signatures
Chapter Five: Intervals
Chapter Six: Modes
Chapter Seven: Major Scales
Chapter Eight: Minor Scales
Chapter Nine: Key Signatures
Chapter Ten: Triads

Near the end of most chapters there are several introductory eartraining exercises. Some of the exercises include intervallic,
melodic and rhythmic identification. Most melodic and rhythmic exercises are very brief excerpts, allowing for relatively fast downloads. For those enrolled in the course, cues to request tests are provided periodically throughout the course. At appropriate times, four major exams are emailed to students. Instructions are given to download the Adobe Acrobat file (in PDF format), print it out, fill it out and FAX it back to the instructor within 24 hours. A final exam may be taken anytime during the university's final examination week.

ADMINISTRATION ISSUES

Users may access the course without any restrictions or they may formally enroll to take the course for college credit through this university. Only enrolled students are able to email requests for tests at appropriate times and to ask for help from the instructor.

The involvement of the instructor in the course administration is quite minimal. The university registrar completes the enrollment process and handles all fees and records, the Office of Continuing Education promotes the course and disperses information regarding enrollment procedures and course requirements, and the Department of Music handles referrals and answers departmental questions. The maximum enrollment for the course is officially set at one student so that all students above that number must seek special approval to register for the course. An unofficial enrollment cap has been set at 10 students. The initial contact with the instructor is usually nothing more than an email request to get started on the course.

Since the implementation of Introduction to Music Theory and Aural Skills (the web version) in the Fall semester of 1998, approximately 35 students have received credit by taking the course. One student received a failing grade while all others received a letter grade of "C" or better.

SOME FINAL PROGRAMMING OBSERVATIONS

A new edition of the course is currently underway and involves reprogramming the content using Macromedia's Director. The principal objective in the revision is cosmetic: to make the material more appealing and presentable. The first two chapters have been completed and some initial observations can be made, comparing and contrasting the two developmental methods.

1. Using software, such as Director, to create an interactive learning environment seems to save no time when comparing that development method to writing in JavaScript-enhanced HTML code. For the inexperienced programmer, both writing methods will require a research period, whether to learn how to use the software being employed or to learn the language of HTML (and how to adapt JavaScript). The two examples shown below represent a means of navigating from page to page. The first is programmed in

HTML and the second in Director. While the objective of each is the same, the manner by which each is programmed is very different.

HTML Page Links

DIRECTOR Page Links

2. Java is a programming language that is nearly universally understood by newer browsers. Downloaded documents created with Director will not be understood by a browser unless the appropriate helper software (available for free) has been installed.

3. Each chapter has between 15 and 25 pages of content. Each page written in HTML is a separate document and is loaded individually to the local computer for use and each takes only a few seconds to load. Using Director, the entire chapter is written as a user-controllable document and each chapter requires a substantially longer loading time. However, after the entire chapter has been downloaded to the computer, each page is nearly immediately accessible.

4. Using HTML, certain special effects require more extensive programming skills than this author has acquired. Many of those same effects are readily available using Director. Some of those effects include animating images and dissolving and wiping between pages and graphics. Of particular note, clicking on an image to activate an audio file was a programming problem with JavaScript. Using Director, the image was imported as a cast member, given a behavior (on mouseDown) and the task was no problem.

5. Since graphics are treated as sprites in Director, images, unusual fonts, backgrounds and banners are not a problem to incorporate onto a page. Controlling such elements, using motion, color changes and fades is quite easy. Using HTML to program content, control over those individual elements is difficult to impossible without the aid of Java.

6. Finally, an observation about security can be issued. An HTML document contains code that, without encryption, can be viewed by anyone. If a student wants to find an answer to a question that is posed (on a practice test, for example), s/he can, with most browsers, view the document source. Documents created with Director may be saved as Director files which, in turn, may be referenced by HTML documents. The student (or user) is not immediately accessing the Director document - only a reference to it. That means the code is not immediately accessible and a greater degree of security is achieved.

CONTACT

The course

Introduction to Music Theory and Aural Skills (the complete HTML course)
http://www.murraystate.edu/qacd/cfac/music/MUS109entry.htm
Introduction to Music Theory and Aural Skills (Chapter One: Musical Symbols, the Director version)
http://www.murraystate.edu/qacd/cfac/music/mus109e/chapter1/chapter1.html

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